# PRELIMINARY SURVEY OF
# ELECTROMET CORPORATION
# UNION CARBIDE METALS DIVISION
# NIAGARA FALLS, NEW YORK

Work performed
by the
Health and Safety Research Division
Oak Ridge National Laboratory
Oak Ridge, Tennessee 37830

March 1980

OAK RIDGE NATIONAL LABORATORY
operated by
UNION CARBIDE CORPORATION
for the
DEPARTMENT OF ENERGY
as part of the
Formerly Utilized Sites--
Remedial Action Program

ELECTROMET CORPORATION
UNION CARBIDE METALS DIVISION
NIAGARA FALLS, NEW YORK

At the request of the Department of Energy (DOE, then ERDA), a preliminary survey was performed at the former Electromet Plant (currently Union Carbide Corporation - Metals Division plant) in Niagara Falls, New York (see Fig. 1), on August 24, 1976, to assess the radiological status of those facilities utilized under Mannattan Engineer District (MED) contract during the period 1943 through 1946. Robert D. Forgeng, Plant Manager, provided information about the contract operations and identified the former site of the one building (a cinder block and wood structure) utilized in the process. C. R. Allenbach and Don Hawkes also provided information as to the building location and project operations. Also, Bill Chynoweth, an employee at the plant during the MED contract period, provided information about operational processes and assisted in identifying the location of the building which was demolished about 1958.

The project involved receiving Green Salt ($UF_4$) in drums from the Linde Air plant at Tonawanda, New York, reacting the Green Salt in furnaces, converting it to metal, and then recasting it into ingots. The building was formerly located where Building 166 now stands and just west of Building 163 (see Figs. 2 and 3) which existed at the time of the project. The former process building was constructed of wood and cinder block and was about 18 x 46 m at one end and 14 x 46 m at the opposite end. Waste from the operation was disposed at the Lake Ontario Ordnance Works depot. Residues of dolomite slag liners ($MgF_2$ slag), uranium chips, and crucible dross associated with the process were shipped to other sites for uranium recovery.

## Present Use of Facilities

The building utilized in the MED project was washed, vacuumed, and, in some locations, the concrete floor and some wood platforms were removed (see Report ND4600). Following the project (post-1946), the building was used for zirconium processing from 1947 to 1948, and later titanium was processed prior to demolition. Building 166 (see Fig. 4)

was constructed on the site of the former process building, and it is currently used by Union Carbide's Metal Division operations.

## Results of Preliminary Survey

The preliminary survey was performed by H. W. Dickson of the Oak Ridge National Laboratory and W. T. Thornton of the DOE/Oak Ridge Operations Office (then ERDA). Accompanying Dickson and Thornton during the survey was C. R. Allenbach, Don Hawkes, and Bill Chynoweth. Measurements taken at this site included external gamma-ray exposure rates taken at 1 m in height and beta-gamma dose rate taken at 1 cm from the surface. Results of the survey measurements were within background levels with the exception of slightly elevated background with maximum beta-gamma dose-rate readings of 0.1 mrad/hr at a location between Buildings 163 and 166. Survey measurements in sections of the old Union Carbide dump (200 to 300 acres and now owned by CECOS International, Inc.) located to the north of Pine Avenue (see Figs. 5 and 6) resulted in radiation levels that were not significantly above background levels. Some of the waste from the process and rubble from the demolition of the old building has been buried at this dump.

In view of the near background radiation measurements taken at this site, a comprenersive, formal survey will probably not be required. However, it is suggested as a precautionary measure to (1) obtain further measurements between Buildings 163 and 166 to define extent of elevated readings, (2) obtain a soil sample at location in (1) wnere maximum $\beta$-$\gamma$ and external gamma measurements are observed, (3) drill core samples in the old Union Carbide dump to determine if any radioactive material has been deposited in this area.

A formal survey of this facility was performed as part of the dismantlement and decommissioning of Electromet by the Health and Safety Division of the AEC on August 11 and 14, 1953. The results of this survey are reported in the attached document.

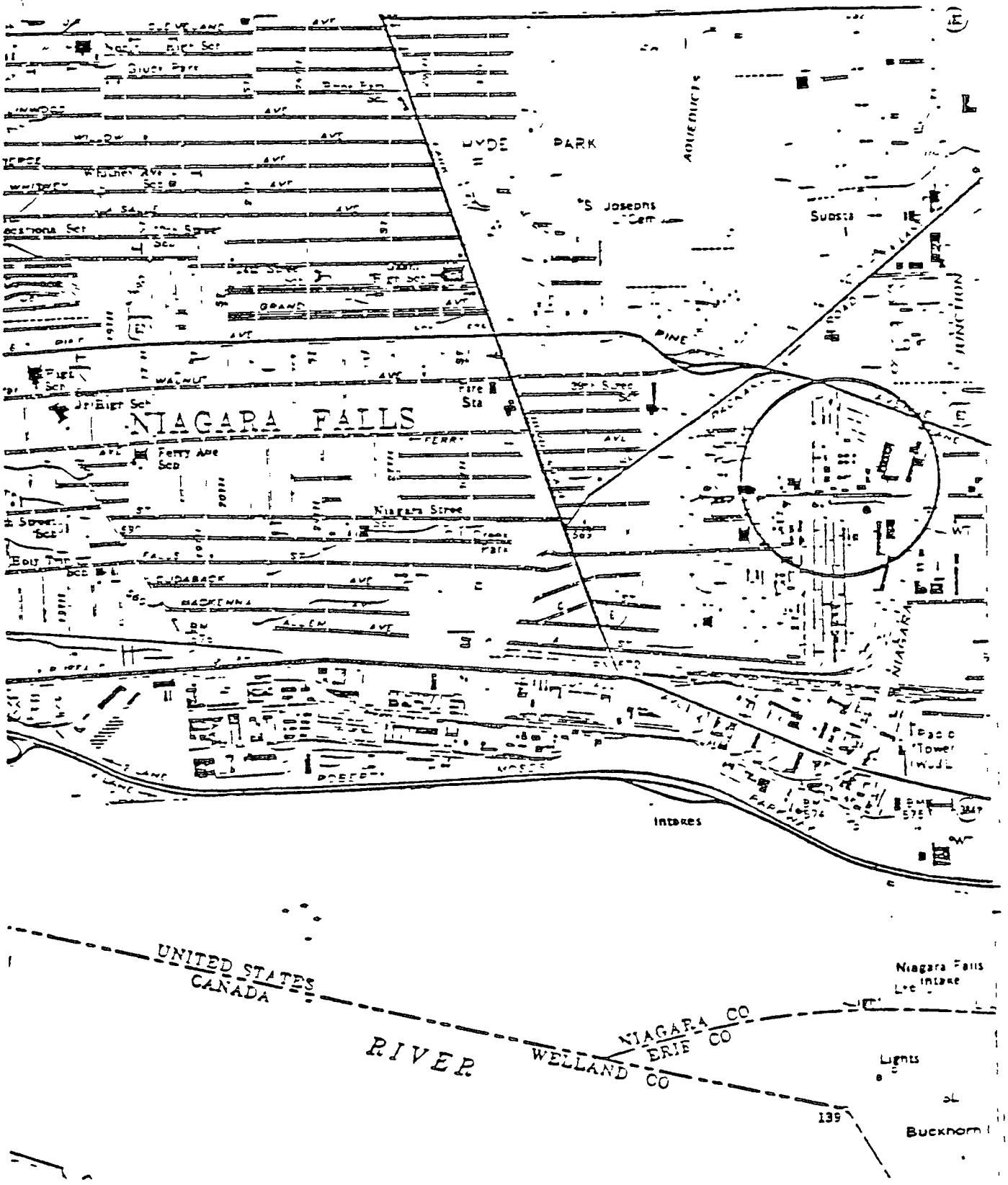


Fig. 1. Location of the Electromet Corporation - Union Carbide Metals Division site in Niagara Falls, New York

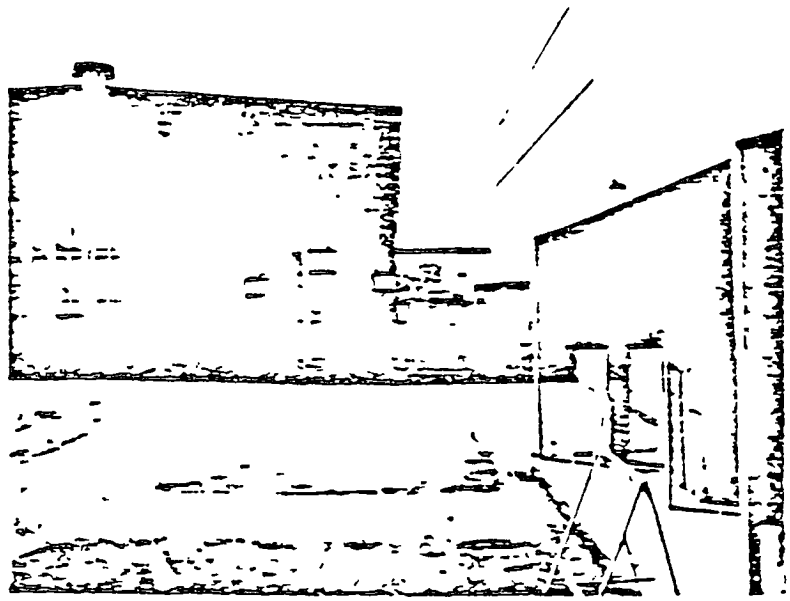

Fig. 2. North end of Building 163 and east side of Building 166.

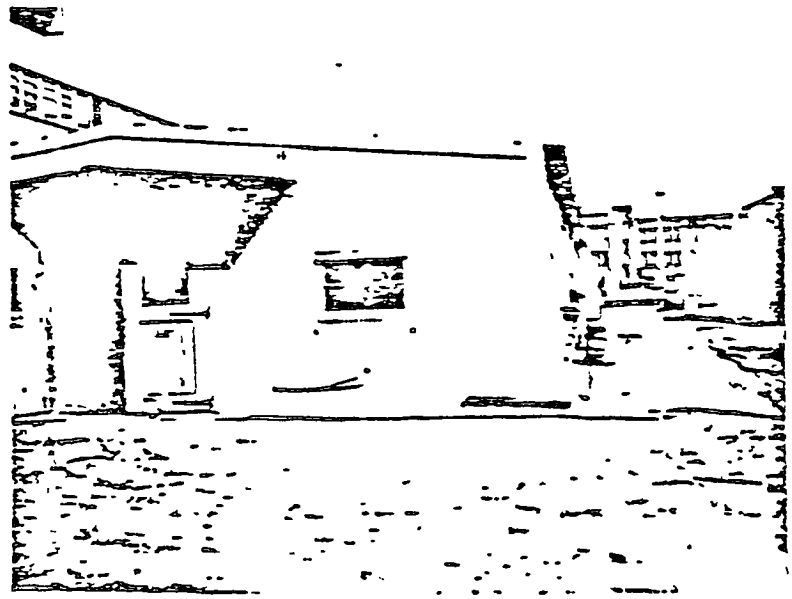

Fig. 3. South end of Building 163 and east side of Building 166.

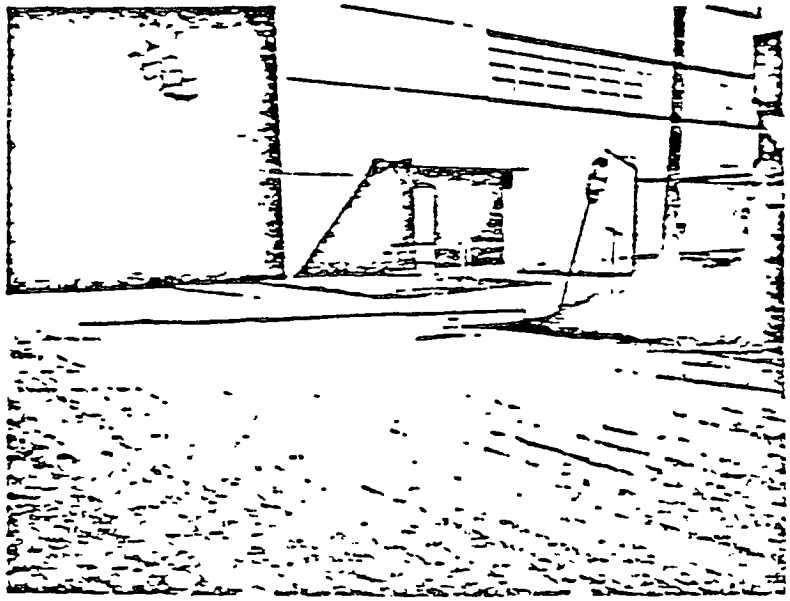

Fig. 4. Building 166.

Fig. 5. Old Carbide Dump (now "Niagara Recycling").

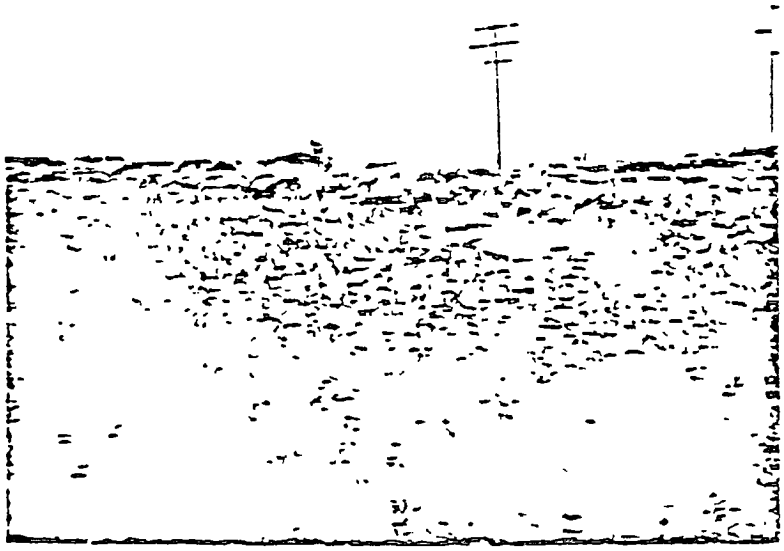

Fig. 6. Old Carbide Dump (now "Niagara Recycling").

# Office Memorandum • UNITED STATES GOVERNMENT

TO : R. L. Kirk, Director,
Production Division

DATE September 28, 1953

FROM : W. B. Harris, Chief,
Industrial Hygiene Branch, Health & Safety Division

SUBJECT: DISMANTLEMENT OF ELECTRONET CO. - CONTRACT NO. W-7405-ENG-14
DECONTAMINATION SURVEY OF AUGUST 11th and 14th, 1953.

SYMBOL: HSE:PBH

A resurvey of contamination was made by the Health and Safety Division in the standby green to metal plant of the Electromet Company, Niagara Falls, New York. This survey was made at the request of Mr. B. F. Fields, Electromet Plant Superintendent and our Administrative Operations and Legal Divisions in order to determine whether the radiation levels are being met before release from commission control.

On the visit of August 11, 1953, it was found that Electromet personnel were in the process of removing wooden structures around the vacuum casting furnaces, piping and other structural equipment. The results of the radiation survey of December 10-12 and the recommendations contained in the memo dated February 3, 1953, to F. M. Belmore from W. B. Harris re Decontamination were reviewed with Mr. Fields. In addition, decontamination procedures for removal of uranium contamination were discussed with plant personnel.

On August 14, 1953, a revisit to the plant was made to determine:

1. The degree of contamination of remaining equipment and the building proper.

2. Need for any additional recommendation for plant cleanup.

PROCEDURES

Direct radiation measurements were taken on all equipment, floors and walls of the plant using Eltronic and Detectron Beta-Gamma survey meters. Smear samples were taken from those locations and equipment at which high smears were found in the December, 1952 survey. The smears were taken over an area of 150 sq. cm. using 1-1/8" Whatman filter paper.

During cleanup operations and the contamination study general air samples were collected on 1-1/8" Whatman #41 filter paper, employing a universal sampler at 20 liters per minute as the basic equipment. The samples were taken in such former operations areas as the graphite burnout, vacuum casting as billet saw areas.

o/1

RESULTS OF SURVEY

Radiation target levels for decontamination have been revised since the December, 1952 survey due to a recommended increase in any beta exposure of five times the previous level. The criteria for decontamination which must be met by any buildings before release by NYOO are now:

1. The average gamma radiation at 3 feet from the floors or walls should not exceed 0.3 mr/hr. The average beta-gamma radiation measured in a like manner should not exceed 1.5 mrep/hr.

2. The maximum gamma radiation measured from the floors or walls should not exceed 0.6 mr/hr. The maximum beta-gamma radiation measured in a like manner should not exceed 3.0 mreps/hr.

3. No gamma radiation measured in contact with the floor should exceed 0.9 mr/hr. The maximum beta-gamma radiation measured in a contact with the floor should not exceed 4.5 mrep/hr.

Due to the nature of the survey instrument employed and the material measured, the field beta gamma intensities must be computed to the actual beta-gamma value using the expression:

$$\beta\gamma_{actual} = 2\beta\gamma_{Field} - \gamma_{Field}$$

The attached table which contains the results of the computed direct radiation measurements and smear samples taken on equipment, walls, floors and other building structures reveals the following:

(a) The highest gamma reading (0.1 mr/hr) was found on the floor of the old graphite burnout area. The concomitant $\beta\gamma$ measurement was only 1.7 mrep/hr.

(b) The highest beta gamma contamination (4.4 mreps/hr) was found on the Racine cutting machine #931. Gamma contamination was negligible.

(c) Mechanical saw #1630 was found to be contaminated with 4.0 mreps/hr beta gamma.

(d) A high beta-gamma reading of 5.0 mreps/hr was found on the Lancaster mixer. Gamma contamination was negligible.

(e) Vacuum casting equipment wooden platforms, and the former green machining equipment were removed from the building at the time of this survey. This equipment and contaminated wood partitions were checked and found to be uranium contaminated. It was agreed by Mr. Fields and Dr. Spedding, project leader, that the wood partitions would be burned and ashes buried. Other equipment, such as furnace casting equipment and parts was to be sent to LOSA for storage and disposal.

(f) All other equipment was found to meet the radiation target levels.

Of the eleven general air samples taken in the standby green to metal plant during cleanup operations only one sample (117 $\alpha$ d/m/m$^3$) exceeded the present acceptable level of 70 $\alpha$ d/m/m$^3$. However, the average general air concentration for the eleven samples was only 18 $\alpha$ d/m/m$^3$. The following table shows the average high and low general air concentrations found at specific locations:

| Location | Concentration d/m/m$^3$ | | | Number of Samples |
|---|---|---|---|---|
| | Average | High | Low | |
| Center of area 20 ft. South of Macrine Saw | 12 | 25 | 2 | 4 |
| Center of area 10' South vacuum casting area | 7 | 14 | 3 | 3 |
| At graphite burnout area | 40 | 117 | 2 | 4 |

$\alpha$ d/m/m$^3$ = alpha disintegrations per minutes per cubic meter of air.

CONCLUSION

This survey shows that a negligible degree of contamination both to equipment and to building has been measured. Since this contamination study was made during such major cleanup operations as demolition of floor by air hammer, sweeping, etc.. and inasmuch as the criteria for uranium contamination has still been met by the plant, it is recommended that the plant be released by the government.

Three pieces of equipment, namely the Racine Cutter, Mechanical Saw and Lancaster mixer found to contain beta-gamma up to 5.0 mreps/hr was scrubbed and sand blasted by Electromet personnel since this survey. Beta-gamma survey measurements by Dr. R. Spedding revealed no reduction in beta-gamma contamination.

The Electrometallurgical Co., according to Dr. Speeding, intends to use the aforementioned equipment in conjunction with their own radio metallurgy program. It is recommended that Electromet notify the NYOO they will agree not to sell the contaminated equipment to any third party and will not hold the NYOO responsible for any damages incurred by Electromet personnel in using this equipment.

Att:
Table of Radiation Reamings and Smear Results.

(1) Do we require Electromet to have equipment?
(2) This is covered, isn't it, by hold harmless clause in pol?
(3) What do we have to do to close file?

# TABLE OF DIRECT RADIATION READINGS AND SWAB RESULTS

| Location | Direct Radiation (mrep/hr) | mr/hr | Smear Sample d c/m/sample |
|---|---|---|---|
| Entrance to Lab. 3' level | neg. | neg. | |
| Entrance to Lab. Floor (Kentile) | .04 | neg. | 74 |
| Chem. Lab.-Lab Desk near door | .06 | neg. | 57 |
| Chem. Lab. Cupboard | 0.1 | neg. | 1.8 |
| Chem. Lab. 3' level | neg. | neg | |
| Chem. Lab.-Office Floor | .06 | 0.02 | 107 |
| Chem. Lab. Office Wall | neg. | neg. | 1.1 |
| Corridor in front of Chem. lab. floor | neg. | neg. | |
| Vicinity Men's room-3' level | neg. | neg. | |
| Vicinity Men's room-floor | .06 | neg. | 52 |
| Wall near men's room | 0.1 | neg. | 72 |
| Old graphite area- 3' level | .18 | neg. | |
| Old graphite area- floor | 1.7 | 0.1 | 187 |
| Floor inside graphite burnout area | 0.16 | .04 | 10 |
| 3' level between vacuum furnace and wall | .07 | .03 | |
| Floor between vac. furnace and wall | .55 | .04 | 432 |
| Wall between vac. furnace and wall | .27 | .03 | 234 |
| 3' level-Main entrance to plant | .02 | neg. | |
| Floor- Main entrance | .12 | neg. | 174 |
| Floor around cut-off saw 931 | .12 | neg. | 44 |
| Floor around cut-off saw 1630 | .11 | .01 | 38 |
| Saw area 3' level | .04 | neg. | |
| Near storage room 3' level | neg. | neg. | |
| Near storage room- floor | neg. | neg. | 216 |
| Floor under former vac. furnace platform | .75 | .05 | 234 |
| 3' level at former vac. furnace platform area | .29 | .01 | |
| Buffalo room 3' level | neg. | .01 | |
| Near Buffalo room (floor entrance) | .09 | neg. | 338 |
| Lancaster Room-3' level | .06 | .01 | |
| Lancaster room-Wall | neg. | neg. | |
| Lancaster room-floor | .09 | .01 | |
| Ice crusher room-3' level | neg. | neg. | |
| Ice crusher room-floor | .18 | neg. | |
| Old GFF furnace | .42 | .02 | |
| Vicinity of old GFF furnace | .35 | .01 | 657 |
| Old bomb breakout room-floor | .11 | .01 | 66 |
| Old jolter area of old break-out room- floor | .10 | .01 | 66 |
| Old jolter area of old break-out room-wall | .09 | .01 | 21 |
| Near main entrance of old break-out room- 3' level | 1.54 | .04 | |
| Buffalo room- 3' level | 0.08 | .01 | |
| Buffalo room-floor | 1.06 | neg. | 338 |

# TABLE OF DIRECT RADIATION READINGS AND SMEAR RESULTS

| Name of Item | Govt. No. | Direct Radiation | | Smear Sample |
|---|---|---|---|---|
| | | $\alpha$ (mrep/hr) | $\gamma$ mr/hr | $\alpha$ c/m/sample |
| Lancaster mixer | - | 5.0 | neg. | |
| Mechanical Sun | 1630 | 4.0 | neg. | |
| Racine cutting machine | 931 | 4.4 | neg. | |
| Fire Blanket | 481 | .12 | neg. | |
| Stretcher | 804 | 0.2 | neg. | |
| Hydraulic lifter | 165 | 2.0 | neg. | |
| Crusher | 1023 | 0.1 | neg. | 140 |
| Hydrowheel | 483 | .8 | neg. | 36 |
| Truck | 1220 | .24 | .02 | 291 |
| Piping to Buffalo Forge | | .12 | .01 | 41 |
| Buffalo forge | 83 | .44 | .02 | 283 |
| Buffalo Forge exhauster | | .10 | neg. | 60 |

# PRELIMINARY SURVEY OF THE UNION CARBIDE CORPORATION METALS DIVISION PLANT, NIAGARA FALLS, NEW YORK

Work performed
by the
Health and Safety Research Division
Oak Ridge National Laboratory
Oak Ridge, Tennessee 37830

December 1980

OAK RIDGE NATIONAL LABORATORY
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# PRELIMINARY SURVEY OF THE UNION CARBIDE CORPORATION METALS DIVISION PLANT, NIAGARA FALLS, NEW YORK

B. A. Berven and R. W. Doane

## Introduction

On September 24, 1980, two representatives from Oak Ridge National Laboratory visited Union Carbide Corporation's Metal Division Plant (UCC-MD) in Niagara Falls, New York. The purpose of the visit was to perform a radiological survey of property where anomalously high levels of radiation were observed during an earlier preliminary survey of this site (see attachment). This report presents the results of this radiological survey.

A diagram of the technology area of the UCC-MD plant is shown in Fig. 1. The location of the anomalous radiation levels was between Buildings 163 and 166 where beta-gamma dose-rate levels were measured at 0.1 mrad/h at the ground surface.

## Survey Methods

The preliminary radiological survey of the UCC-MD Technology Area consisted of the following measurements or samples: (1) a gamma-ray scan of the outside ground surface; (2) two bias surface soil samples from outside locations where external gamma radiation levels were significantly above background; (3) a gamma-ray scan of the inside floor and wall surfaces of Building 163; (4) bias alpha measurements inside Building 163 where external gamma radiation levels were significantly above background, (5) five smear samples from inside Building 163 measuring transferable alpha and beta contamination.

Portable instrumentation used in this survey included a gamma-ray scintillator [NaI (Tl)] survey meter, an alpha scintillation [ZnS (Ag)] counter, and a Geiger-Mueller (G-M) survey meter.

## Survey Results

### Outside

The gamma-ray scanning of the ground surface in the Technology Area at UCC-MD indicated wide-spread contamination over an extensive portion of this property (see shaded area in Fig. 2). Relatively high concentrations

of gamma-emitting radionuclides were observed in localized areas External gamma exposure rates on ground surfaces were measured, ranging from background (approximately 10 μR/h) to a maximum of 3 mR/h. The contamination appeared to be low-level but uniform under several asphalt pads, and high-level and "spotty" following two railroad spurs traversing the property.

The highest external gamma levels (3 mrad/h)* observed in the area where surface soil sample $NF_1$ (see Fig. 3) was located Potentially contaminated material appeared to be located beneath the asphalt pads surrounding Buildings 163 and 171. Surface exposure rates were a general 30 μR/h around Building 171, but appeared to be highly variable around Building 163, ranging from 17 to 100 μR/h.

The location of two surface soil samples (0-15 cm) taken in the Technology Area are shown in Fig. 3. The results are listed below.

| Sample | External Gamma Exposure Rate at Ground Surface (μR/h) | Radionuclide Concentration (pCi/g) | | |
|---|---|---|---|---|
| | | $^{238}U$ | $^{226}Ra$ | $^{232}Th$ |
| $NF_1$ | 3000 | 3200 ± 3% | 3300 ± 4.8% | 860 ± 7.1% |
| $NF_2$ | 83 | 81 ± 3% | 72 ± 1.7% | 190 ± 7.2% |

The highest external gamma readings were found at the surface of the soil, with the levels decreasing rapidly with increasing depth.

Inside Building 163

Low-level contamination was found inside Building 163 during a cursory survey. The surface external gamma levels from the walls and floor were within typical background ranges (13 to 17 μR/h). The alpha activity on the walls and floor were elevated but not significantly above background levels at 68 dpm/100 $cm^2$.

Cracks in the floor of Building 163 exhibited elevated radiation levels, with external gamma activities ranging from 17 to 50 μR/h, and alpha activity over these cracks ranging from 100 to 150 dpm/100 $cm^2$.†

*This exceeds Nuclear Regulatory Commission's maximum beta-gamma level guideline of 1.0 mrad/h at 1 cm (see Ref. 1).

†This exceeds Nuclear Regulatory Commission's guideline of 100 dpm/100 $cm^2$ for alpha activity originating from $^{226}Ra$ (see Ref. 1).

Five smear samples were taken to determine the amount of transferable alpha and beta contamination. The location of the smear samples are identified in Fig. 4. The levels of transferable alpha and beta-gamma contamination were all at background levels.

At location "b", surface external gamma levels measured 80 μR/h and alpha activity measured approximately 530 dpm/100 $cm^2$ (also above NRC guidelines). At location "c", beta-gamma levels of 0.12 mrad/h were observed.

## Discussion

Relatively high concentrations of radionuclides in the $^{232}Th$ and $^{238}U$ decay chains exist in the surface soil in the Technology Area at UCC-MD in Niagara Falls, New York. These materials also appear in cracks and seams in the walls and floor of Building 163.

Dr. C. R. Allenback, Manager of Environmental, Health, and Product Safety Affairs at the UCC-MD, indicated thorium-bearing ores were used during operations at this site, however, these operations were unrelated to Manhattan Engineer District (MED)/Atomic Energy Commission (AEC) activities. In view of the nature of past MED/AEC operations (limited to reacting of $UF_4$ to uranium metal), it seems unlikely that the present contamination on-site is related to those MED/AEC activities. However, because uranium appears to be present in the soil in significant amounts, contamination due to MED/AEC activities cannot be eliminated, but only considered improbable.

## Recommendations

Based on the results of this preliminary survey, it is recommended that a formal detailed radiological survey of the Technology Area at the UCC-MD Plant in Niagara Falls, New York, be conducted by some responsible agency since radiation levels exceed Nuclear Regulatory Commission guidelines for unrestricted use.

## References

Nuclear Regulatory Commission, "Guidelines for Decontamination of Facilities or Equipment Prior to Release for Unrestricted Use or Termination of Licenses for By-Product, Source, or Special Nuclear Material," November 1976.

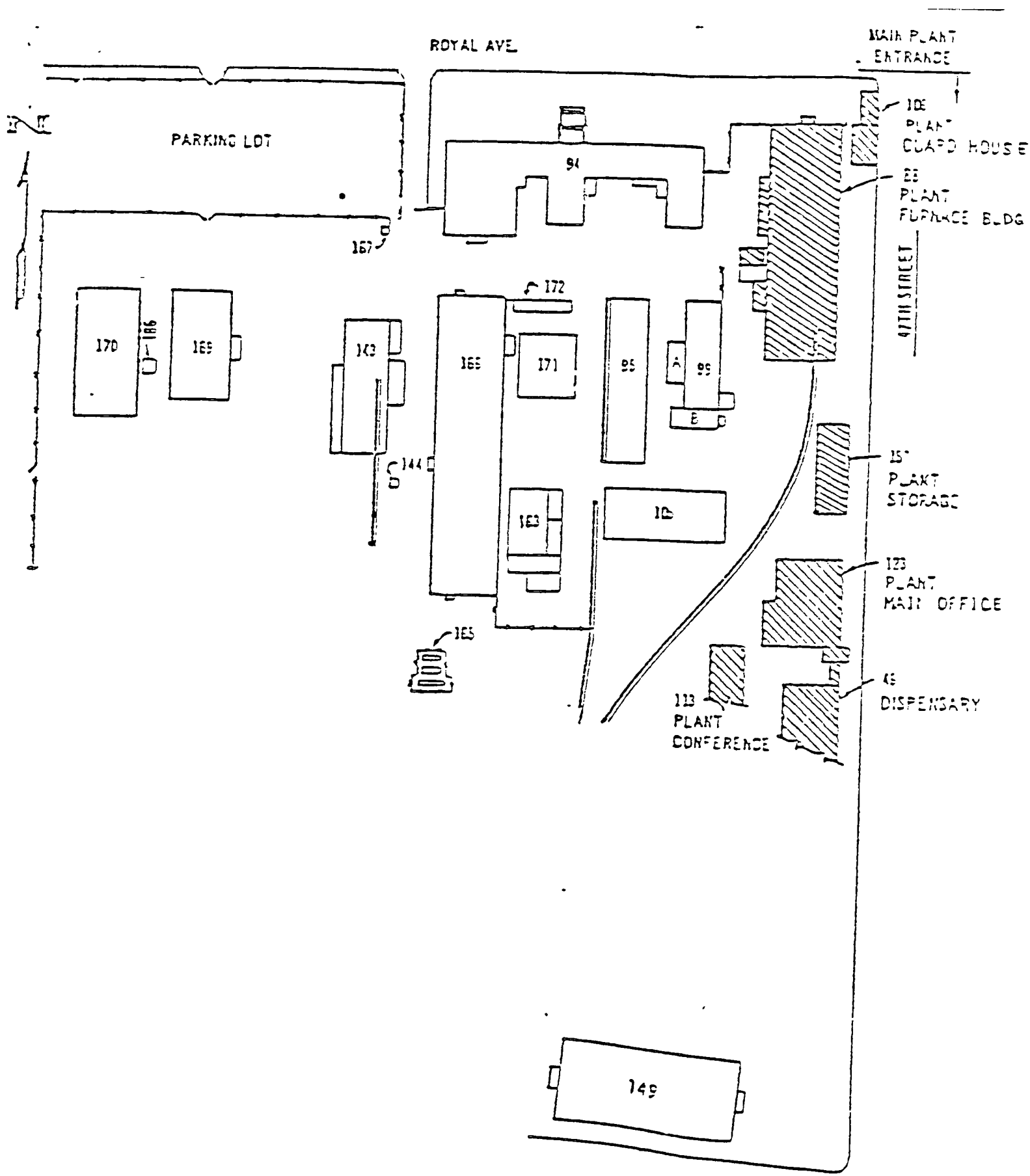


Fig. 1. Technology Area at the Union Carbide Corporation - Metals Division Plant (former Electromet site) in Niagara Falls, NY (adapted from UCC-MD drawing).

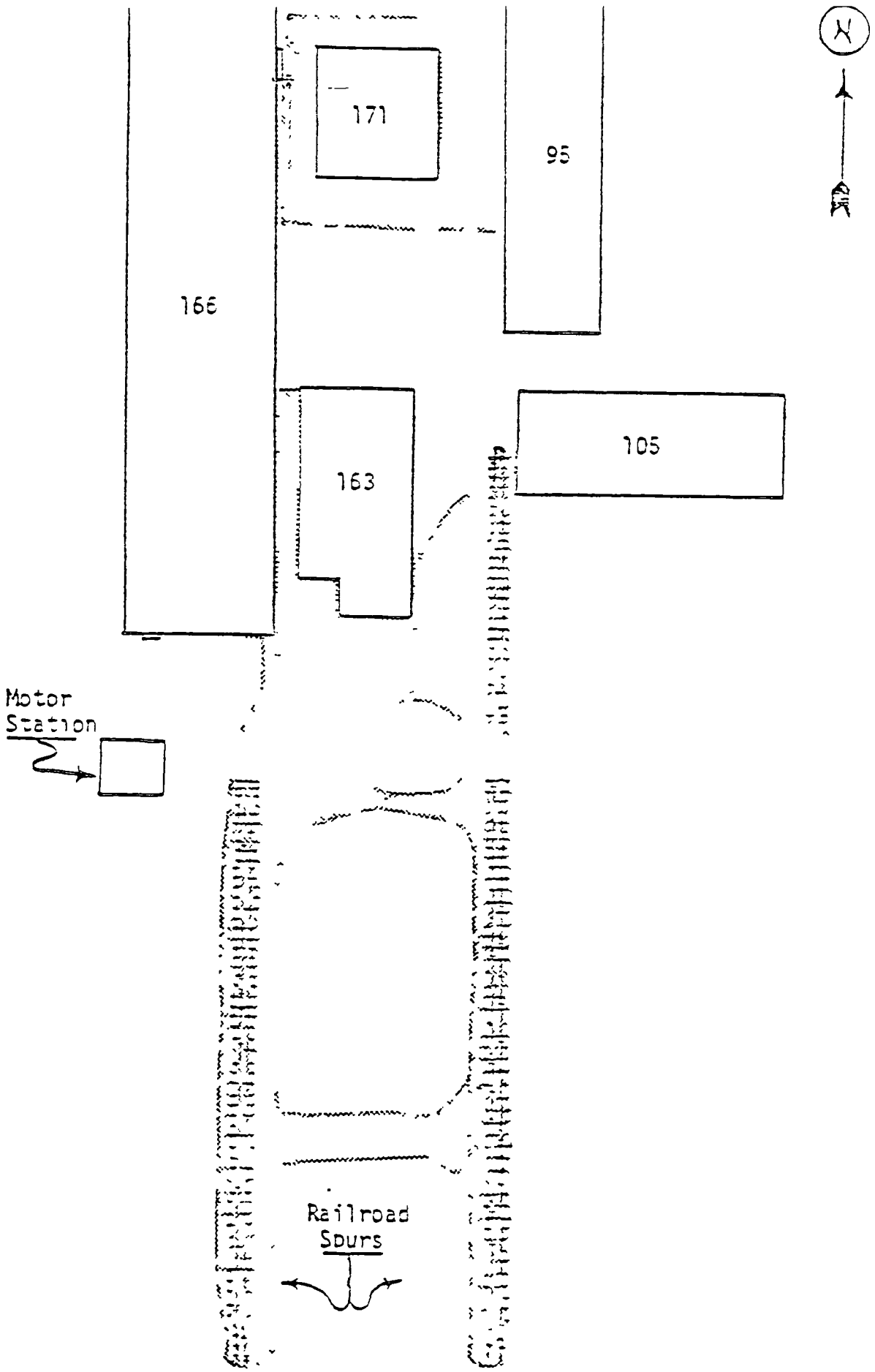


Fig. 2. Location of elevated surface gamma-ray levels (indicated by shading) in the Technology Area at UCC-MD, Niagara Falls, NY.

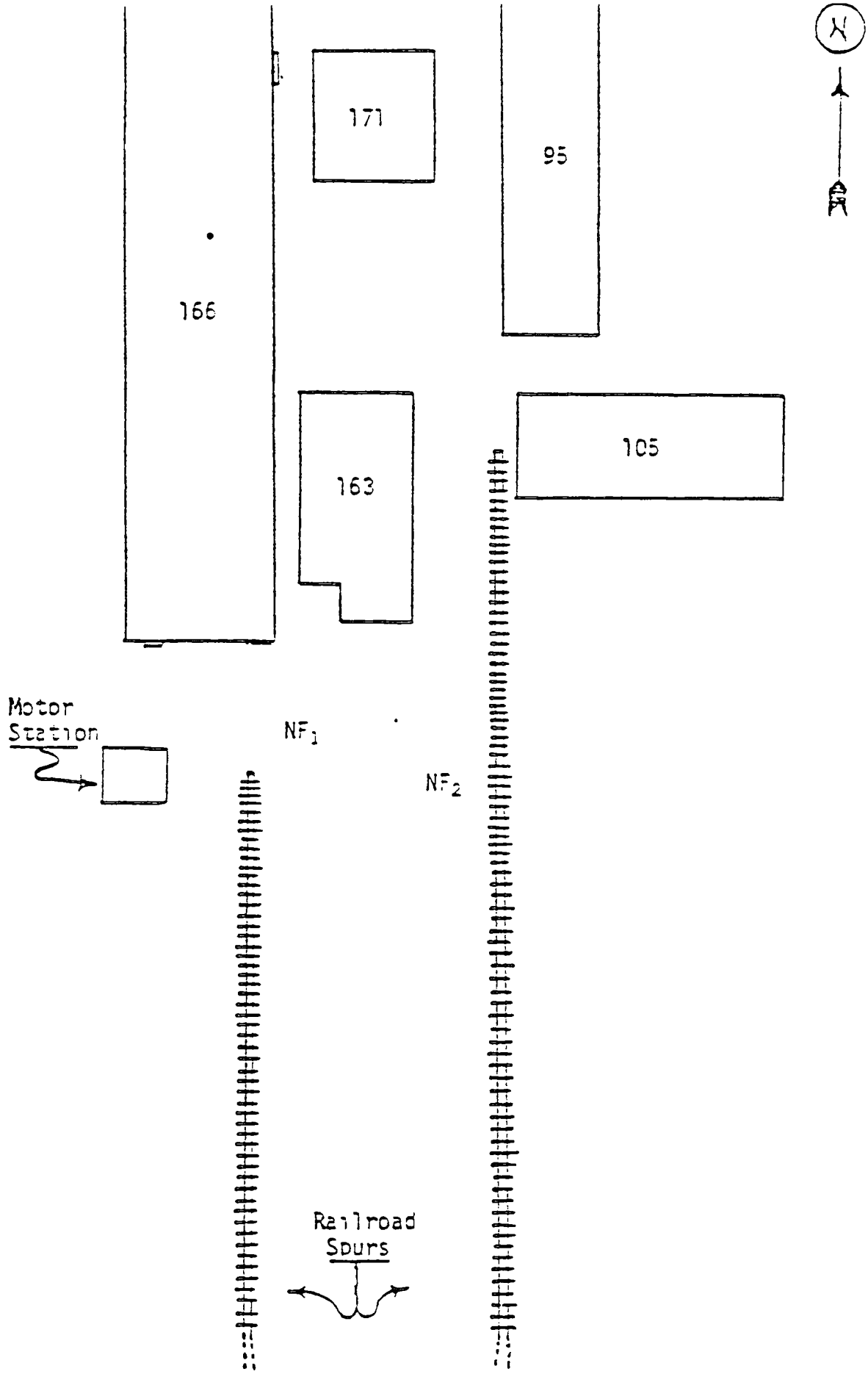


Fig. 3. Location of surface soil samples taken in the Technology Area of UCC-MD in Niagara Falls, NY.

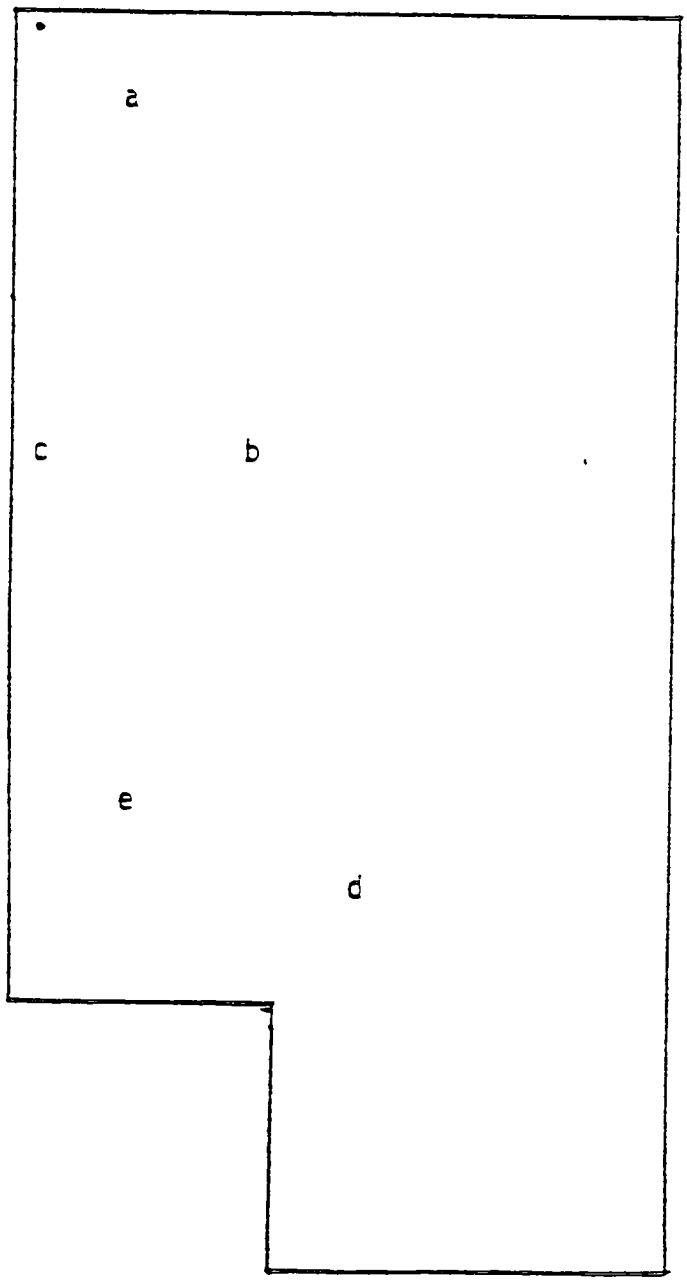


Fig. 4. Location of smear samples in Building 163 in the Technology Area of UCC-ND in Niagara Falls, NY.

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Changes shown to 4/9/86 draft

CFR 0033j 4/16/86

ENVIRONMENTAL AGREEMENT (Niagara Falls)

AGREEMENT made as of this day of April, 1986, by and among Union Carbide Corporation, a New York corporation having an office at 39 Old Ridgebury Road, Danbury, Connecticut 06817-0001 ("Union Carbide"), Umetco Minerals Corporation, a Delaware corporation having an office at 39 Old Ridgebury Road, Danbury, Connecticut 06817-0001 ("Umetco") (Union Carbide and Umetco being hereafter collectively called "Seller") and U. S. Vanadium Corporation, a Delaware corporation having an office at _____ ("USV") and Strategic Minerals Corporation, a Connecticut corporation having an office at 30 Main Street, Danbury, Connecticut 06810 ("Stratcor") (USV and Stratcor being hereafter collectively called "Buyer").

WITNESSETH

WHEREAS, USV has acquired substantially all the assets of Umetco's U.S. vanadium business pursuant to a Purchase Agreement among Union Carbide, Umetco and Stratcor dated April___, 1986 (the "Purchase Agreement"); and

WHEREAS, the parties desire to provide for certain services to be rendered, work to be done and liabilities to be assumed with respect to Umetco's vanadium and tungsten products processing facility located at Niagara Falls, New York (the "Niagara Falls Facility"), and

WHEREAS, pursuant to the Purchase Agreement, Seller will be transferring to USV all of the environmental permits, licenses and approvals ("Environmental Permits") as identified in Schedule _____ to the Purchase Agreement; and

WHEREAS, Seller and Buyer acknowledge that USV will require a reasonable amount of time after the closing of the Purchase Agreement in order to accomplish a prompt transfer of the Environmental Permits;

NOW, THEREFORE, the parties hereto hereby agree as follows

1. Indemnification.

(a) Subject to the provisions of Articles 3 and 7 below, Seller hereby assumes and will be liable for, and shall indemnify Buyer against and hold Buyer harmless from, any and all costs, claims, damages, lawsuits, attorneys' fees, losses, deficiencies, judgments, actions, liabilities and obligations of any kind or description (collectively called "Claims") asserted against, incurred or required to be paid by Buyer (regardless of when asserted or by whom), resulting from Seller's business operations at the Niagara Falls Facility prior to the date of this Agreement. Seller's obligation hereunder is limited to the Claims and Seller shall have no liability whatsoever for incidental or consequential damages to USV.

(b) USV hereby assumes and will be liable for, and shall indemnify Seller against and hold Seller harmless

from any and all Claims asserted against, incurred or required to be paid by Seller (regardless of when asserted or by whom), resulting from USV's business operations at the Niagara Falls Facility from and after the date of this Agreement. USV's obligation hereunder is limited to the Claims and USV shall have no liability whatsoever for incidental or consequential damages to Seller.

(c) Notwithstanding the provisions of paragraph (a) above, but subject to the provisions of paragraph (f) below, Buyer agrees that Seller shall have no further indemnification obligation to Buyer with respect to the reclamation, restoration, testing and/or disposal activities and obligations as set forth in paragraphs (a), (b), (c), (d), (e), (f), (g), (h) and (i) of Article 3, but only upon completion of such reclamation, restoration, testing and/or disposal activities or satisfaction of such obligations by Umetco. Upon request from Seller, Buyer will deliver to Seller a written release confirming the cessation and termination of indemnification contemplated in this Article 1, such release to be in form and substance satisfactory to Seller's counsel.

(d) Buyer further agrees that Seller shall have no indemnification obligation to Buyer with respect to

(i) any PCBs in oil filled switches in the Niagara Falls Facility.

(ii) PCBs in capacitors, transformers, oil supplies or in any other areas of the Niagara Falls Facility, except as specifically enumerated in paragraph (a) of Article 3 below.

(iii) any asbestos in the Niagara Falls Facility except as specifically enumerated in paragraph (e) of Article 3 below.

(e) Upon termination of production of products at the Niagara Falls Facility, Buyer and Seller agree to share any final restoration, reclamation or remediation costs required by applicable laws relating to the plant site (provided that any saleable/salvageable assets in the plant will be sold and the proceeds applied to total reclamation liabilities) and any other areas not specifically enumerated in this agreement in proportion to their respective periods of occupancy of the Niagara Falls Facility. Buyer's share of such costs shall in no event exceed its occupancy of the Niagara Falls Facility (expressed as a percentage) multiplied by $1,000,000.

(f) Buyer and Seller agree to assert no claims of any kind against each other as a result of Seller's, its contractors' or consultants', or Buyer's performance of or supervision of the Work (as hereinafter defined) except in the event of the gross negligence or willful misconduct of the other party.

(g) Notwithstanding the provisions of paragraph (c) above, Seller's indemnification obligation set forth in paragraph (a) above shall not cease and terminate in the event the Niagara Falls Facility is listed as a "Superfund" site pursuant to the Comprehensive Environmental Response, Compensation and Liability Act.

2. Indemnification Procedure; Right to Contest Reclamation Requirements.

(a) Buyer shall notify Seller within 45 days from the assertion of any Claim or discovery of any fact upon which Buyer intends to base a claim for indemnification hereunder. Buyer's failure to so notify Seller shall relieve Seller from any liability under this Agreement to Buyer with respect to such Claim. Seller shall have the right at its own expense to participate jointly with Buyer in the defense of any claim, demand, lawsuit or other proceeding in connection with which Buyer claims indemnification hereunder and, with respect to any issue involved in such claim, demand, lawsuit or other proceeding as to which Seller shall have acknowledged the obligation to indemnify Buyer hereunder, Seller shall have the sole right to settle or otherwise dispose of such claim, demand, lawsuit or other proceeding on such terms as Seller, in its sole discretion, shall deem appropriate.

(b) Seller shall notify Buyer within 45 days from the assertion of any Claim or discovery of any fact upon which Seller intends to base a claim for indemnification hereunder. Seller's failure to so notify Buyer shall relieve Buyer from any liability under this Agreement to Seller with respect to such Claim. Buyer shall have the right at its own expense to participate jointly with Seller in the defense of any claim, demand, lawsuit or other proceeding in connection with which Seller claims indemnification hereunder and, with respect to any issue involved in such claim, demand, lawsuit or other proceeding as to which Buyer shall have acknowledged the obligation to indemnify Seller hereunder, Buyer shall have the sole right to settle or otherwise dispose of such claim, demand, lawsuit or other proceeding on such terms as Buyer, in its sole discretion, shall deem appropriate.

(c) Seller and Buyer shall each retain the right to contest any restoration, reclamation or remediation requirements imposed by State or other environmental authorities having jurisdiction over the Niagara Falls Facility.

3. Other Environmental Matters.

(a) PCB Transformers and Capacitors. Umetco agrees to assume the cost of retrofilling, replacing or disposing of the following capacitors and transformers as promptly as feasible.

| Item | Action |
|---|---|
| Transformers 5, 21, 22, 33, 34, 35, 110, 111, 143 | Retrofill |
| Transformers 4, 23, 24, 122, 159, 160 and 161 | Dispose |
| Transformer 119 | Dispose & Replace |
| 86 Capacitors for #32 furnace | Dispose |
| 27 Miscellaneous Capacitors | Dispose |
| Shaft Furnace Capacitors | Dispose |

Umetco further agrees to assume the cost of cleanup and disposal of PCB contaminated sludges, oils, waste material currently on site or that will be accumulated when the above equipment is retrofilled or removed. Specifically, Umetco assumes the cost of cleanup and disposal of PCB contaminated soil under the "Owl" transformers, i.e., Nos. 159, 160, and 161, if necessary. ("Retrofilling" is defined as replacing, flushing, etc., of PCB contaminated oils, which when refilled and after the required test runs under power, test at less than 50 ppm PCBS.)

(b) Halide Scrubber. Umetco further agrees to assume the cost of completing installation after the date of this agreement of the halide scrubber now being installed and any corrective modifications to insure compliance with applicable regulations. Once completed and operating as now designed, USV

accepts responsibility for obtaining necessary permits for the system.

(c) Chrome Oxide. Umetco further agrees to assume the cost of disposal of 64 drums of chrome oxide now located at the Niagara Falls Facility.

(d) High Antimony Tungsten. Umetco further agrees to assume the cost of disposal of approximately 100,000 pounds of high antimony tungsten molybdenum oxide now located at the Niagara Falls Facility.

(e) Asbestos in Freight Elevator. Umetco further agrees to assume the cost of removal of the asbestos lining in the globar elevator.

(f) "Super Sucker" Dust. Umetco further agrees to test the various waste piles of plant dust deposited by the "Super Sucker" industrial cleaning firm in the plant yard to determine whether such piles are Hazardous Waste (as defined in the Resource Conservation Recovery Act or comparable state law). If any such piles are determined to be Hazardous Waste, under applicable laws, Umetco agrees to assume the cost of removal and disposal of such piles.

(g) Sample Cans. Umetco further agrees to assume the cost of removal and disposal of the numerous small sample cans in the globar area.

(h) Yard Area Ores and Slags. Umetco further agrees to conduct a radiation survey and surface sampling program of

the plant yard area to determine whether or not Hazardous Waste is present in the yard area. If Hazardous Waste is found, Umetco agrees to assume the cost of reclamation or remediation of the plant site or disposal of such Hazardous Waste, as required by applicable law. At termination of USV's operations at the Niagara Falls Facility Buyer and Seller agree to share the cost of reclamation of the plant yard area based upon their respective periods of occupancy of the Niagara Falls Facility, unless USV's operations at said facility have created a materially more expensive reclamation problem (when compared with reclamation based upon an assumed continuation of operations as conducted in the past by Seller and using the results of the radiation survey and surface sampling program as a benchmark), in which event the excess plant yard reclamation costs will be borne by Buyer. (The parties acknowledge that Seller has been conducting operations at the Niagara Falls Facility since 1919.)

(i) Plant Buildings. Umetco further agrees to assume the cost of decontaminating the three areas of the plant which have been determined to be radioactive based upon Umetco's radiation survey of the plant.

(j) Miscellaneous Slags and Re-Melts in Yard Area. Buyer agrees to assume the cost of disposal, if required, of 20,000 pounds of vanadium aluminum remelts, 4,000 tons of

miscellaneous slags from various furnace operations, piles of lime, etc. in the plant yard area, and empty drums around the plant and all other miscellaneous materials currently on the plant site and not specifically enumerated in paragraphs (a) through (i) above.

(k) Storage Tanks. If in the future USV is required by law to modify, repair or remove the underground gasoline and/or waste oil storage tanks due to evidence of leaking, Seller and Buyer agree to share the cost of modification, repair or removal based upon their respective periods of occupancy of the Niagara Falls Facility, except if such modification, repair or removal is due solely to the business operations of USV, in which event USV shall solely bear such cost.

4. Environmental Work and Access to Premises.

Seller and Buyer have agreed upon a program of work affecting the environment, including, but not limited to, reclamation, restoration, remediation and cleanup, as described in Articles 1 and 3 above, to be performed at the Niagara Falls Facility (hereafter the "Work") by and under the supervision of Seller and at Seller's sole cost and expense. A plan for the Work, including estimated costs of performing various aspects thereof and estimated time schedules for completing the Work, is attached hereto as Schedule A. Seller agrees to supervise

the performance of the Work and covenants that the Work will be performed in a good and workmanlike manner, and in compliance with applicable laws (or, in the absence of such laws, in accordance with generally accepted environmental engineering standards). USV hereby grants to Seller, its contractors and consultants, the right and license to enter the Niagara Falls Facility for the purpose of supervising and performing the Work. Seller agrees, for itself, its contractors and consultants, to exercise such right and license so as to minimize any interference with or disruption of USV's normal commercial operations at the Niagara Falls Facility.

5. Coordination Committee, USV Performance of the Work.

(a) USV and Umetco will each designate two (2) representatives to serve on a Coordination Committee which will oversee the performance of the Work with the goal of assuring completion of the Work in a timely and cost-effective manner, with minimal interference with USV's normal commercial operations at the Niagara Falls Facility.

(b) Upon Umetco's reasonable request, USV will perform all or any portion of the Work described in Schedule A, in a good and workmanlike manner. Umetco shall pay USV monthly upon receipt of invoice for USV's actual costs of performing the Work (or otherwise agreed contract price).

6. Cost Verification.

USV's books and records will be open to inspection by Umetco upon reasonable notice and during normal business hours, but not more than once every six (6) months, for the purpose of verifying USV's costs of performing the Work.

7. Bridging of Environmental Permits.

(a) To the extent that applicable federal, state or local statute, law, regulation, rule or order requires action to be taken by or on the part of Seller in order for USV to obtain a Transfer of the Environmental Permits, Seller shall take or cause to be taken all such action, and Seller otherwise shall cooperate with USV in obtaining such Transfer. As used in this Article 7, a "Transfer" of Environmental Permits shall mean and include, as applicable, the substitution of USV's name on, and a transfer, reissuance or new issuance to USV of, such Environmental Permits, without any continuing obligation or liability of Seller whatsoever, including, without limitation, as a guarantor or surety thereof.

(b) From and after the closing of the Purchase Agreement, Seller shall maintain, at Buyer's sole cost and expense pursuant to Paragraph (c) below, each of the Environmental Permits, including all bonds, guarantees or other financial sureties relating thereto or required thereby ("Sureties") until the earlier of (i) expiration of each such

Environmental Permit (it being acknowledged that Seller shall have no obligation to renew any Environmental Permit hereunder) or (ii) Transfer of each such Environmental Permit; provided, that during such time USV diligently shall use its best efforts to obtain a Transfer of the Environmental Permits and to obtain any Sureties related to or required by such Environmental Permits. In connection therewith, USV, as promptly as possible, but in no event later than one (1) month after the date of this agreement, shall submit to or file with the appropriate governmental or regulatory authorities, in a complete fashion, all applications and other documents required to be so submitted or filed by USV in order to obtain a Transfer of the Environmental Permits, provided, that such time limitation shall be extended with respect to each applicable Environmental Permit by such period of time that any failure by USV to comply therewith is attributable to action or inaction by or on the part of Seller. Upon either expiration or Transfer of each Environmental Permit as described in subparagraphs (b)(i) or (b)(ii) above, USV's obligation to reimburse Seller for such maintenance of that Environmental Permit shall cease and Seller shall have the right to cancel such Environmental Permit and/or Surety, to the extent such cancellation is permitted by law. USV promptly shall notify Seller of the Transfer of each Environmental Permit and Seller

promptly shall notify USV of any change in the previously scheduled expiration of any Environmental Permit and of any change in the provisions of each Environmental Permit.

(c) Except with respect to any net income taxes payable by Union Carbide, the maintenance of the Environmental Permits and/or Sureties as described in Paragraph (b) above shall be absolutely net to Seller, and Buyer shall reimburse Seller for all direct costs and expenses incurred by Seller in connection with such maintenance, provided, that Seller shall provide USV with such documentation as USV reasonably may request in order to verify the amount of such maintenance costs and expenses. Seller shall invoice USV for all amounts payable hereunder and payment shall be due net thirty (30) days from the date of invoice. If USV fails to make any payment to Seller hereunder when due with respect to any such Environmental Permit, then Seller shall have the right to terminate this agreement with respect to such Environmental Permit if USV does not cure such default within twenty (20) days after notice thereof from Seller.

(d) Prior to Transfer of the Environmental Permits, Buyer shall cooperate with Seller and provide whatever information is needed and perform whatever actions are necessary to comply with the Environmental Permits in a manner consistent with Seller's past policies and in compliance with

the terms and conditions of the Environmental Permits. If USV shall fail to comply with any material term or condition of any Environmental Permit or breach any commitment, agreement or obligation under this agreement, then Seller shall have the right to terminate this agreement with respect to such Environmental Permit if USV does not cease and, if necessary, cure any such noncompliance or breach as soon as practicable but in no event later than twenty (20) days after notice thereof from Seller or within any shorter time period as required by any governmental or regulatory authority, provided, however, that if in Seller's sole good faith judgment any such noncompliance or breach creates, contributes to, or results in, or is likely to create, contribute to, or result in, an emergency situation, Seller may immediately suspend USV's operations under applicable Environmental Permits until such emergency situation or potential emergency situation has ceased, and, if necessary, has been cured. Notwithstanding anything to the contrary contained in the foregoing, Seller shall not terminate this agreement or suspend USV's operations under any Environmental Permit based solely upon (i) noncompliance with the transfer provisions of any Environmental Permit or (ii) any breach of this agreement based solely upon noncompliance with such transfer provisions unless an applicable federal, state or local government or regulatory

authority issues an order or notice of violation that USV's operations under such Environmental Permit is in violation of its transfer provisions and indicates that it will or may take remedial action against Seller as a result thereof. Seller shall promptly notify USV of the termination or suspension of USV's operations under any Environmental Permit under this Paragraph (d) and the reasons therefor.

(e) Buyer shall indemnify Seller against and hold Seller harmless from all claims, damages, losses, liabilities, demands, assessments, fines, penalties, administrative orders, notices of violation, suits, actions or proceedings, costs, expenses and obligations, including interest, penalties and reasonable attorneys' fees (collectively, "Claims"), which arise out of or in connection with (i) USV's failure during the applicable period set forth in paragraph (b) above to comply with the terms and conditions of any Environmental Permit, or the statutes, laws, regulations, rules, orders or codes pertaining thereto or (ii) any breach of any commitment, agreement or obligation by USV under this agreement, provided, however, that USV shall not be obligated to indemnify Seller against any Claims arising solely out of or in connection with any failure by Seller to comply with applicable transfer provisions of the Environmental Permits. These indemnification provisions relate to this Agreement and shall be in addition

to, and not in derogation of, the respective rights, obligations, liabilities and indemnifications of Seller and Stratcor pursuant to the Purchase Agreement.

8. Headings.

Article headings are not to be considered a part of this Agreement, are included solely for convenience, and are not intended to be full of accurate descriptions of the contents thereof.

9. Governing Law.

This Agreement shall be construed in accordance with and governed by the laws of the State of Connecticut.

10. Notices.

Any notice or other communication required or permitted hereunder shall be in writing, and shall be deemed to have been given if placed in the United States mail, registered or certified, postage prepaid, addressed as follows.

If to Seller, addressed c/o Union Carbide as follows

39 Old Ridgebury Road
Danbury, Connecticut 06817
Attention: President, Umetco Minerals Corporation

If to Buyer.

Strategic Minerals Corporation
30 Main Street
Danbury, Connecticut 06810

with a copy to.

Gager, Henry & Narkis
30 Main Street
Danbury, Connecticut 06810
Attention: David R. Chipman, Esq.

Each of the foregoing shall be entitled to specify a different address by giving notice as aforesaid to the others.

11. Disputes. Any dispute that the parties are unable to resolve may be submitted to any court having jurisdiction over such dispute.

12. Entire Agreement, Survival, No Waiver.

This Agreement and the other documents and instruments contemplated hereby or thereby constitute the entire agreement between the parties pertaining to the subject matter hereof, and supersede all prior and contemporaneous agreements, understandings, negotiations and discussions, whether oral or written, of the parties, and there are no warranties, representations or other agreements between the parties in connection with the subject matter hereof, except as specifically set forth herein. No supplement, modification, waiver or termination of this Agreement shall be binding unless executed in writing by the party to be bound thereby. No waiver of any of the provisions of this Agreement shall be deemed or shall constitute a waiver of any other provision hereof (whether or not similar), nor shall such waiver

constitute a continuing waiver unless otherwise expressly provided herein.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be entered into and executed by their officers thereunto duly authorized as of the date and year hereinabove set forth.

UNION CARBIDE CORPORATION

By: _____

Title: _____

UMETCO MINERALS CORPORATION

By: _____

Title: _____

STRATEGIC MINERALS CORPORATION

By: _____

Title: _____

U.S. VANADIUM CORPORATION

By: _____

Title _____

## SCHEDULE A

## Description of the Work